18th National and 3rd International Conference of Iranian Biophysical chemistry

هجدهمین همایش ملی و سومین همایش بین المللی بیوشیمی فیزیک ایران

25-26 Des, 2024, University of Hormozgan

۶-۵ دی ماه ۱۴۰۳، دانشگاه هرمزگان

Structural changes in Insulin via binding of anticancer drug of Pomalidomide

Hamid Sheikh[1], Fatemeh Babaei[2], Adeleh Divsalar[3*]

1. MSc Student of Biochemistry ,Department of Cellular and Molecular Biology, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran , hamidshe@khu.ac.ir
2. MSc Student of Biochemistry ,Department of Cellular and Molecular Biology, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran , babei.ftm@gmail.com
3. Professor, Department of Cellular and Molecular Biology, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran , *divsalar@khu.ac.ir

Abstract

Insulin is a peptide hormone produced by the beta cells of the pancreas that plays a critical role in regulating blood glucose levels. By binding to its specific receptors on cell surfaces, insulin can facilitate the uptake of glucose from the bloodstream into cells. It is commonly used in the treatment of type 1 and type 2 diabetes, particularly in patients experiencing elevated blood sugar levels due to deficiencies in insulin production or function. Pomalidomide is an anti-cancer drug primarily used in the treatment of multiple myeloma, a type of blood cancer. This drug suppresses the growth of cancer cells by inhibiting certain immune processes and activating caspases. In this study, the interaction of pomalidomide with insulin protein was examined to assess potential changes in the structure and function of this hormone. Fluorescence spectroscopy and ultraviolet-visible (UV-Vis) spectroscopy were employed for this purpose.

Intrinsic fluorescence results indicated that the addition of pomalidomide to insulin solution can led to a significant decreasing and quenching in the fluorescence intensity of insulin, which could be attributed to structural or conformational changes in the protein. Fluorescence emission data analysis using the Stern-Volmer and the logarithmic Hill equations revealed that approximately one binding site exists for

pomalidomide on insulin at different temperatures of 27 and 37 °C. This binding occurs through a static mechanism, which may indicate a specific type of interaction between the drug and the protein.

Key words: Insulin, Pomalidomide, Fluorescence Spectroscopy, UV-Visible Spectroscopy